

REMARKS/ARGUMENTS

Claims 1-33 are now in the application. Claims 1, 12, 15, 16, 18, 23 and 30-33 are amended. Claims 1 and 18 are independent claims.

Drawings

The Office Action objects to Figure 5 because only that which is old is illustrated therein. Applicants have submitted a replacement sheet in which the legend "Prior Art" is placed on Figure 5. Applicants therefore request that this objection be withdrawn.

Specification

The Office Action objects to the specification because it does not contain section headings. Applicants have amended the specification to include appropriate section headings and request that this objection be withdrawn.

The Office Action noted the requirement for an abstract on a separate sheet. Applicants have submitted an abstract as required by 37 CFR 1.72(b).

The specification was objected to because of informalities on pages 30, 31 and 33. Applicants have amended the appropriate paragraphs and request that this objection be withdrawn.

Information Disclosure Statement

Applicants acknowledge the Examiner's statement that the IDS filed on 2/5/2001 contained references listed in the IDS filed 2/28/00 and that the references in the later IDS have therefore been crossed out.

Claim Objections

The Office Action objects to informalities in claims 15, 16, 23, 32 and 33. Applicants have amended these claims as required by the Examiner and request that these objections be withdrawn.

Claim Rejection under 35 U.S.C. 112.

The Office Action rejects claim 12-15 and 30-32 under 35 U.S.C. 112, second paragraph.

In particular, the Office Action rejects claims 12-14 because claim 12 recites "the means for altering parameters" without sufficient antecedent basis.

Applicants have amended claim 12 to now read, in relevant part: "the means for altering ~~parameters~~ the bandwidth". As a means for altering the bandwidth is introduced in

claim 8, there is now antecedent basis for claim 12. Applicants therefore request that this rejection be withdrawn.

The Office Action rejects claim 15 because of a contradiction with claim 1, from which it depends, concerning the term exporting and the later claim that “the communications apparatus is within the personal computing device”.

Applicants have amended claim 1 to recite “exporting at least a part of the digitised modulated signal to main processor in a personal computing device”. Claim 15 is, therefore, consistent with claim 1, and applicants request that this rejection be withdrawn.

The Office Action rejects claims 30 and 31 because of the lack of antecedent basis for the limitation “the means for altering parameters”. Applicants have amended claim 30 to recite “the means (1133) for controlling the bandwidth”. As a “means for controlling the bandwidth” is introduced in claim 26, from which claims 30 and 31 depend, there is antecedent basis in the claims for the amended limitation. Applicants, therefore, request that this rejection be withdrawn.

The Office Action rejects claim 32 because of a contradiction with claim 18, from which it depends, regarding “importing” and the limitation that “the communications apparatus is within the personal computing device”. Applicants have amended claim 18 to recite “importing ... from a main processor in a personal computing device”. Claim 32 is consistent with claim 18. Applicants, therefore, request that this rejection be withdrawn.

Claim Rejection under 35 U.S.C. 102

The Office Action rejects claims 1, 2, 6-9, 11-14, 16-19, 21, 24-27, 29-31 under U.S.C. 102 as being anticipated by Leung et al. (U.S. Patent 5,444,697).

Applicants' invention enables a low cost digital radio receiver to be constructed in which the main processor of a PC (or other kind of personal computing device) is used to perform the computationally intensive demodulation steps. A ‘front-end’ for the PC can then be constructed which handles incoming RF signals but performs no demodulation at all. See for example:

In a broad sense, the invention is designed to exploit the extremely fast main processor integrated circuits (ICs) and large memory capacity available within PCDs, particularly IBM-PC compatible machines. The processor chips fitted to such systems are often capable of outperforming dedicated digital signal processing (DSP) ICs and have plenty of spare computing capacity ... (Page 10 3rd paragraph).

This approach is potentially far cheaper than prior art approaches, in which a dedicated (and relatively costly) DSP chip is deployed to perform the computationally intensive demodulation steps. Leung exemplifies this prior art approach since it explicitly teaches a dedicated DSP to perform modulation (see Figure 1 items 21 – 24) and demodulation (Figure 1 items 60 – 65).

In Leung, the QAM steps (11 and 72) that do take place in a PC are not modulation/demodulation per se, but merely preparatory encoding and decoding steps, as Figure 1 makes explicit. The actual modulation and demodulation steps take place in the dedicated DSPs, as the text makes clear: “In general modulation and demodulation can be efficiently done using Inverse Fast Fourier Transform (IFFT) and Fast Fourier Transform (FFT) algorithms respectively” (column 6 lines 54 – 57). “The IFFT is conveniently carried out by transmitter DSP 20 and is indicated by step 21.” (Column 7 line 25 – 26). “The received data is then processed in receiver DSP 60 and receiver host computer 70 by generally reversing the steps performed in transmitter DSP 20 ...” (column 8 lines 44 – 46).

To further clarify this difference, applicants have amended Claim 1 to clarify the fact that in their invention, demodulation takes place entirely in the PC main processor, obviating the need for a dedicated DSP. Claim 1 now reads:

Communications apparatus comprising means (104), for receiving a modulated radio frequency signal at least one means (105) for down-converting a received modulated radio-frequency signal), means (107) for digitising a down-converted signal and means (108) for exporting at least a part of the digitised modulated signal to a main processor in a personal computing device, the main processor being programmed to perform demodulation of the digitised modulated signal to obviate the need for a DSP.

Similarly claim 18 has been amended to now read:

Communications apparatus comprising (a) means (114) for importing a digital modulated signal from a main processor in a personal computing device (109), modulation to generate the digital modulated signal having been performed by the main processor in the personal computing device to obviate the need for a DSP, (b) means (110) for converting the digital modulated signal to an analogue signal, (c) means (112) for up-converting the analogue signal to a radio frequency signal and (d) means (101) for transmitting the radio frequency signal.

In view of these arguments and amendments, applicants submit that claims 1 and 18 are now allowable, and request that the rejection be withdrawn, and that the claims be allowed.

As claims 2, 6-9, 11-14, 16-17, 19, 21, 24-27 and 29-31 depend from, and include all the limitations, of allowable claims 1 or 18, they are also now allowable. Applicants request that this rejection be withdrawn and claims 2, 6-9, 11-14, 16-17, 19, 21, 24-27 and 29-31 allowed.

Claim Rejection under 35 U.S.C. 103(a)

The Office Action rejects claims 3 and 20 under 35 U.S.C. 103(a) as being obvious over Leung et al. (U.S. Patent 5,444,697) in view of Hammer et al. (U.S. Patent 4,396,987).

As claims 3 and 20 depend from, and include all the limitations, of allowable claims 1 or 18, they are also now allowable. Applicants request that this rejection be withdrawn and claims 3 and 20 allowed.

The Office Action rejects claims 5, 22 and 23 under 35 U.S.C. 103(a) as being obvious over Leung et al. (U.S. Patent 5,444,697) in view of Sugita et al. (U.S. Patent 4,396,987).

As claims 5, 22 and 23 depend from, and include all the limitations, of allowable claims 1 or 18, they are also now allowable. Applicants request that this rejection be withdrawn and claims 5, 22 and 23 allowed.

The Office Action rejects claims 10 and 28 under 35 U.S.C. 103(a) as being obvious over Leung et al. (U.S. Patent 5,444,697) in view of Brajal et al. (U.S. Patent 5,548,582).

As claims 10 and 28 depend from, and include all the limitations, of allowable claims 1 or 18, they are also now allowable. Applicants request that this rejection be withdrawn and claims 10 and 28 allowed.

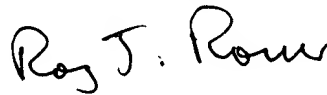
Summary

Therefore in view of the foregoing amendments and remarks, applicant respectfully requests entry of the amendments, favorable reconsideration of the application, withdrawal of all rejections and objections and that claims x be allowed at an early date and the patent allowed to issue.

Respectfully submitted,

Gavin R. Ferris, and
Peter C. Florence

By



Roy J. Rosser
Agent for Applicant
Reg. No. 53,533
(609) 786-1086 (Direct Dial Tel. No.)

Synnestvedt Lechner and Woodbridge
P. O. Box 592
Princeton, NJ 08542-0592
Tel. (609) 924-3773
Fax (609) 924-1811

Cc: Inventors

Amendments to the Drawings

The one attached sheet of drawing includes changes to Fig. 5. The one attached sheet replaces the original one sheet in the application containing Fig. 5.

Figure 5 has been amended by adding the notation "Prior Art" to indicate that this figure represents prior art.